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<b>13. ABSTRACT (Maximum 200 Words)</b>  This is the third Annual Report of the Strategic Environmental Research and Development Program (SERDP) Scientific Advisory Board (SAB).  The Strategic Environmental Research and Development Program was established by the Secretary of Defense pursuant to the 10 U.S.C. Sec 2901. The Program is intended to identify and develop technology that will enhance the capability of the Department of Defense (DoD) and the Department of Energy (DOE) to meet their environmental obligations. In addition, the Program is intended to provide technology and information that may be useful to other governmental and private organizations in addressing environmental concerns. SERDP is also intended to facilitate the transfer of appropriate technology from the private sector to address DoD and DOE environmental and energy issues.				
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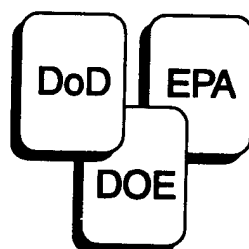
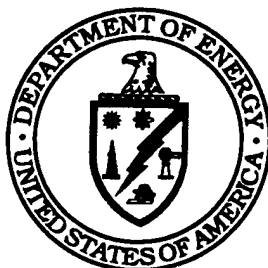
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# SCIENTIFIC ADVISORY BOARD

## FY94 ANNUAL REPORT



# SERDP

Strategic Environmental Research  
and Development Program

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This document was prepared for the Executive Director, Strategic Environmental Research and Development Program (SERDP) by

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**A Partnership to Improve the  
Environment**

March 15, 1995

Dr. Anita K. Jones  
Director, Defense Research and  
Engineering (DDR&E)  
3030 Defense Pentagon  
Washington, D.C. 20301-3030

Dear Dr. Jones:

On behalf of the Strategic Environmental Research and Development Program (SERDP) Scientific Advisory Board (SAB), I am forwarding the FY94 SAB Annual Report to you for submission to Congress.

In this third year, the SAB continued to make contributions to the SERDP by improving the proposal and evaluation process and by offering our recommendations regarding broad programmatic issues. To this end, the SAB worked closer with the Technology Thrust Area Subcommittees that were established last year and reviewed proposals prior to their presentation to the full SAB. This approach enabled those with the appropriate expertise to more thoroughly evaluate a proposal and make a recommendation to the entire Board.

The SAB has become more involved in other aspects of the SERDP process. We participated in the FY94 In Progress Reviews (IPRs) and will continue that participation in the future. Additionally, the SAB was able to review more of the Program in FY94 than in previous years as all projects requesting in excess of \$900K were brought before the Board, rather than only those requesting more than \$1 million. We anticipate continuing this trend. For example, we initiated review of all proposed new starts, regardless of the amount of requested funding.

Finally, I can speak for my colleagues in saying that the SAB fully supports the SERDP goals, process and future directions, including the recently approved outyear investment strategy. It is clear that the Department's refocusing their scarce R&D resources on defense mission-relevant issues is a prudent measure in view of declining budgets. From our perspective, SERDP is fully vested in an improved readiness posture. The benefits of this Program have already made a substantial impact on defense readiness, including the cost, efficiency, and effectiveness of defense weapons systems, platforms, and installations. This contribution, which has been accomplished in an environmentally responsible manner, can only increase in the future.

In addition to the emphasis on military readiness, the Board recognizes that SERDP provides fall-out benefit to the non-Defense sector, as well. As part of its overall investment to date, SERDP has paid substantial dividends in certain non-Defense environmental and environmentally-related areas. Of particular note is the use of defense-unique data, data collection capabilities, and data analytical assets for these purposes. SERDP has successfully leveraged a variety of defense-unique capabilities, such as NASA launch assets and defense/national sensor suites, to provide opportunities for availability, understanding, and use of hitherto unavailable data for the common good of our nation and man-kind.

One good example of this value-added SERDP research is the use of the Integrated Undersea Surveillance System to identify, monitor, and track endangered species of mammals. This information provides detailed data with which scientists can effectively understand the habitat and migration patterns of specific species that may be our primary indicators of global change. Of Defense benefit, this effort allows the U.S. Navy to monitor ocean areas for mammal activity prior to conducting at-sea shock tests, and markedly improves operational readiness of the system's operators. Furthermore, this technology is also demonstrating the capability to detect, isolate, and track poachers operating within protected fishing areas. Our nation's off-shore fishing banks are seriously depleted; without fielding this capability, they may never again regenerate to commercial status.

In addition to maintaining SERDP focus on Defense, high priority mission-related environmental issues, the SAB encourages consideration of dual-use efforts of National and International significance and welcomes the opportunity to review those that take advantage of our defense technology capabilities.

Sincerely,

A handwritten signature in dark ink, appearing to read "Marvin K. Moss". The signature is fluid and cursive, with the first name "Marvin" being more prominent than the last name "Moss".

Marvin K. Moss  
Chairman  
SERDP Scientific Advisory Board

## CONTENTS

	<u>Page</u>
Foreword	iii
Introduction	1
Organization and Process	2
Figure 1 - SERDP Organization Chart	3
Proposal and Project Evaluation Process	4
SERDP Thrust Areas	6
Proposals Reviewed and Recommendations	8
Summary	8
Appendix A - SAB Membership List	A-1
Appendix B - FY94 Proposals and Recommendations	B-1
Appendix C - SAB By-laws	C-1

## FOREWORD

Section 2904(h) of title 10, United States Code, requires that an Annual Report of the Strategic Environmental Research and Development Program (SERDP) Scientific Advisory Board (SAB) be submitted to Congress no later than March 15 of each year. The Annual Report is required to describe the actions of the SAB during the preceding year and to provide any recommendations, including recommendations related to projects, programs, information exchange, and additional legislation within the scope of SERDP. This report includes program recommendations made during the SAB meetings of FY94.

## INTRODUCTION

This is the third Annual Report of the Strategic Environmental Research and Development Program (SERDP) Scientific Advisory Board (SAB).

The Strategic Environmental Research and Development Program was established by the Secretary of Defense pursuant to 10 U.S.C. Sec. 2901. The Program is intended to identify and develop technology that will enhance the capability of the Department of Defense (DoD) and the Department of Energy (DOE) to meet their environmental obligations. In addition, the Program is intended to provide technology and information that may be useful to other governmental and private organizations in addressing environmental concerns. SERDP is also intended to facilitate the transfer of appropriate technology from the private sector to address DoD and DOE environmental and energy issues.

Specifically, the purposes of the Program are the following:

- (1) To address environmental matters of concern to DoD and DOE through support for basic and applied research and the development of technologies that can enhance the capabilities of the departments to meet their environmental obligations.
- (2) To identify research, technologies, and other information developed by the Department of Defense and the Department of Energy for national defense purposes, involved in the development of energy technologies and of technologies to address environmental restoration, waste minimization, hazardous waste substitution, and other environmental concerns; and to share such research, technologies, and other information with such governmental and private organizations.
- (3) To furnish other governmental organizations and private organizations with data, enhanced collection capabilities, and enhanced analytical capabilities for use by such organizations in the conduct of environmental research, including research concerning global environmental change.
- (4) To identify technologies developed by the private sector that are useful to Department of Defense and Department of Energy defense activities concerning environmental restoration, hazardous and solid waste minimization and prevention, and hazardous material substitution, and to provide for the use of such technologies in the conduct of such activities.



The SERDP Scientific Advisory Board was established pursuant to 10 U.S.C Sec. 2904 and charged with the following:

- (1) Providing technical review of each proposed research project equal to or in excess of \$1M, including the estimated costs for research in, and development of, technologies related to environmental activities, and making any appropriate recommendations to the SERDP Council regarding such proposal or project.
- (2) Making recommendations to the SERDP Council regarding technologies, research, projects, grants, programs, activities, and if appropriate, funding within the scope of SERDP.
- (3) Assisting and advising the Council in identifying environmental data and analytical assistance activities within the scope of SERDP.

The SERDP Organization Chart (Figure 1) provides a graphic description of the functional management structure. The SAB is responsible for providing guidance and recommendations to the SERDP Council on those programs reviewed; however, the Council may accept or reject the recommendations. Furthermore, the SERDP Council retains responsibility for Program strategy development.

For FY94, as recommended by the Executive Director, the Scientific Advisory Board reviewed proposed research projects approaching or in excess of \$900 thousand, made recommendations to the SERDP Council regarding the programs reviewed, and assisted and advised the Council in identifying environmental data within the scope of SERDP. Additional responsibilities of the SAB included providing guidance and advice on other environmental issues within the scope of SERDP, as requested by the SERDP Council.

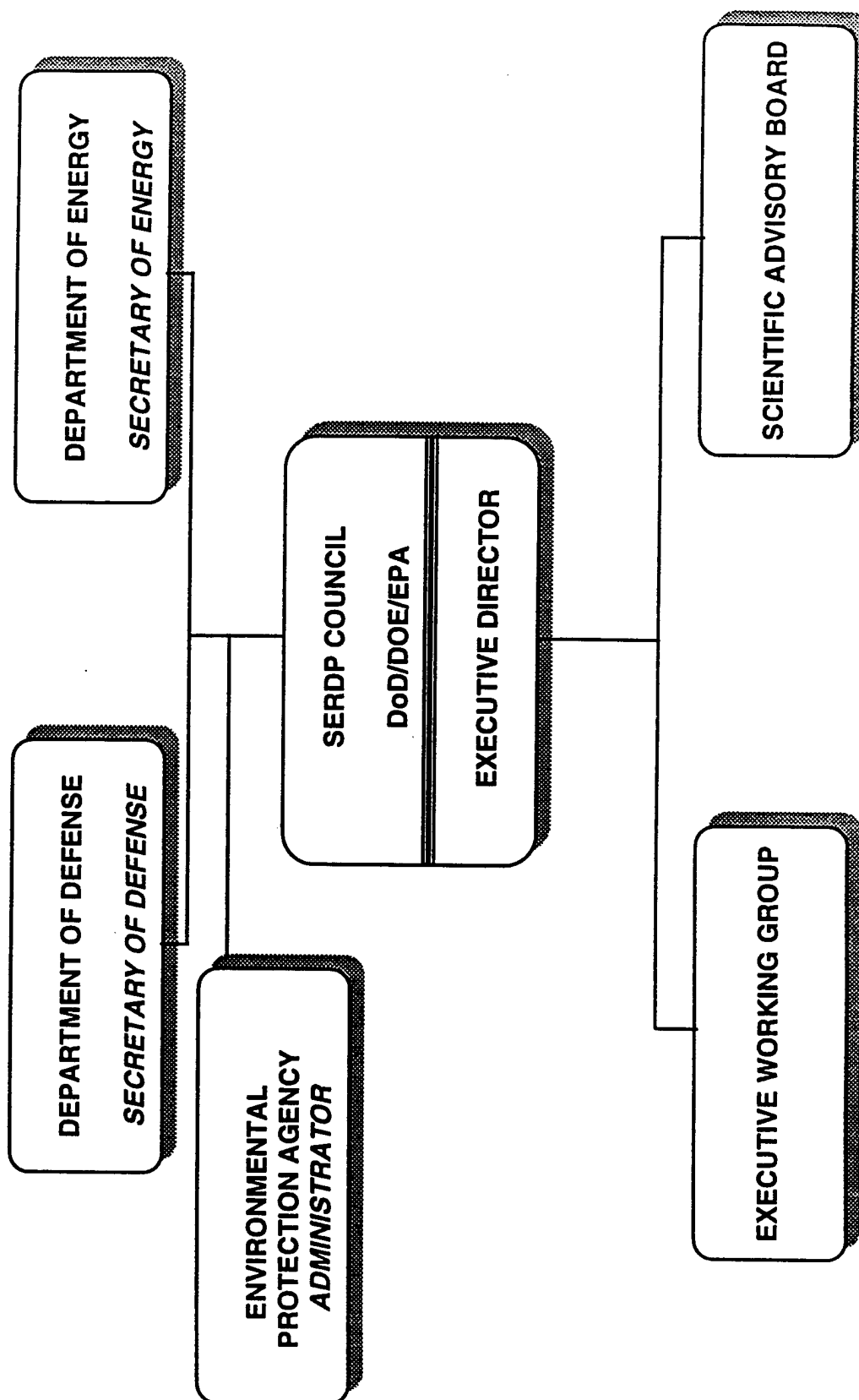
## **ORGANIZATION AND PROCESS**

Section 2904(a-c) of title 10 U.S.C. requires the joint appointment of members of the Scientific Advisory Board by the Secretary of Defense and the Secretary of Energy, in consultation with the Administrator of EPA. Membership on the SAB is consistent with legislative requirements. No new members were appointed during FY94. Appendix A contains a listing of the FY94 members of the Scientific Advisory Board.

On July 9, 1992, the Secretary of Defense appointed Dr. Robert B. Oswald to serve as the Executive Director of SERDP. He was the designated employee of the Federal Government for attending the SERDP SAB meetings in accordance with the requirements of Subsection 10(e) and (f) of the Federal Advisory Committee Act. During FY94, Dr. Oswald called the meetings, approved the agendas, and attended two of the three scheduled meetings of the SERDP SAB. Mr. Gordon Wood, SERDP Counsel, served as the designated federal employee for the third meeting. Of the three SAB meetings held

FIGURE 1

# SERDP ORGANIZATION



during FY94, one was held in the Robert J. Oppenheimer Study Center of the Department of Energy's Los Alamos National Laboratory in Los Alamos, NM; a second was held at the Environmental Protection Agency's Air & Energy Engineering Research Laboratory in Research Triangle Park, NC; and one was held at the National Sheraton Hotel in Washington, D.C. The Scientific Advisory Board reviewed the top 50 percent of recommended proposals during the first meeting, the lower 50 percent during the second meeting, and proposals that were requested to return with further clarification during the third meeting. In accordance with the Federal Advisory Committee Act, announcements of all meetings were published in the Federal Register, the meetings were open to the public, detailed minutes were taken, and all records, reports, minutes, working papers, and agendas were made available for public inspection.

The SAB's Charter was renewed on July 8, 1993 and filed with the Department of Defense, Director of Administration and Management, in accordance to the Federal Advisory Committee Act.

### **PROPOSAL AND PROJECT EVALUATION PROCESS**

Section 2904 of title 10 authorized the SERDP SAB to develop procedures for carrying out its responsibilities. Consistent with this authority, the SAB adopted certain by-laws defining a quorum and instituting procedures for proxy voting (these appear in this document as Attachment C). Further, to capitalize on the expertise of members of the Scientific Advisory Board, Thrust Area Subcommittees that were established in FY93 were fully utilized in FY94. The six subcommittees, consisting of two to three members, met prior to each SAB meeting to review and confer on the proposals being briefed, enabling them to summarize their position and to provide a recommendation to the entire Board. Although each proposal was briefed to the full SAB, the Board had the benefit of additional examination and evaluation by subcommittee members who had the appropriate expertise in the subject thrust area.

In an address to the SERDP Council on August 19, 1994, Dr. Marvin Moss, Chairman of the SERDP SAB, described the SAB review process and the FY94 SERDP Program as follows:

The SAB takes a hard, indeed very hard, look at the proposals during our review. The proposals must have clearly defined R & D goals, be extremely attractive from a technology transfer perspective given the opportunity for further development and/or demonstration, and fit into the accepted guidelines that encompass the strategic environmental needs of DoD and DoE. Many potentially beneficial FY 94 proposals were endorsed for funding to the Council. Also, a lot of programs were rejected for funding at our level. A significant portion of proposed programs were held for more detailed scientific backup, for better insight into anticipated results, or for more rigorous accounting-- particularly with

respect to proposed budgets... [Approximately] 1/3 of the proposals presented to us were either held for more detailed scientific review or, else, rejected outright.

I have polled a good sampling of the active SERDP members as to their views of the FY94 program. Each member believes that the program recommended to the SERDP Council is a solid program, and that it represents the best possible program that we could recommend given the proposals that were offered to the SAB. To be noted, however, is that the SAB does not see all of the proposals that are funded, and we can only comment on that portion of the FY 94 budget that we see.

Beginning in FY94, the SERDP conducted a rigorous series of In-Progress-Reviews (IPRs) for most of the previously funded projects. The SAB members were invited to attend these reviews and encouraged to participate in accordance with their respective Thrust Area Subcommittees. With only one exception, all IPRs were attended by one or more SAB members. Dr. Marvin Moss reflected his thoughts to the SERDP Council as follows:

The IPR's offered the SERDP Program Director, his staff, members of the Technology Thrust Area Working Groups (TTAWGs), some members of the SAB, and other interested DoD, DOE and EPA personnel an opportunity to view, question, and criticize the [six] environmental pillars upon which SERDP is founded.

In the IPR's, detailed reviews of the entire Program in each of these areas were reviewed project-by-project through presentations by the Principal Investigator. Covered were program objectives, progress to date, budget obligations, and expenditures, interactions with other programs for leverage, problem issues, and anticipated progress over the near future. All programs funded by SERDP were covered, whether a \$100K program or a \$1M program. Speaking for the SERDP SAB, and perhaps many of the others, these reviews represented our first opportunity to view the programs both in their entirety and in some degree of depth... Moreover, the opportunity to review the scientific and technical progress differentiated from requests for additional funds for renewal were welcomed by all.

I have talked either individually with each SAB member who attended these IPR's or, in the case of one member who was out of the country, through direct written correspondence. The SAB found these reviews to be most worth while. We strongly believe that SERDP should continue these in-depth reviews at least once per year, and that the scheduling for each particular review be closely coordinated with the one or more SAB members who are directly responsible for that particular pillar or thrust area. The IPR's were not only worthwhile, but they are necessary both for a vigorous program and for program improvement.

## SERDP THRUST AREAS

The SERDP efforts in FY94 were based on the four existing pillars within the Services Environmental Quality Technology Program and two specific areas of Congressional interest -- Energy Conservation/Renewable Resources and Global Environmental Change. These Thrust Areas focused on the need to emphasize the assessment of the state of the global atmospheric and ocean environments; the development and effectiveness of cleanup technologies for hazardous waste; the development of approaches to minimize, treat, and dispose of hazardous waste, as well as methods for assessing hazards in existing and restored sites. SERDP also promoted understanding of the impacts of the Department's operations on our natural and cultural resources and demonstrated alternative and/or clean energy technologies on DoD installations.

### Cleanup

This area focused on technology development and demonstration for more efficient, effective environmental cleanup of soil, sediment, groundwater, surface water and structures contaminated with hazardous, radioactive and toxic materials from past activities. Cleanup/remediation techniques, treatment technologies and monitoring assessment methods were the principal focus of this area.

### Compliance

Compliance included technologies for environmental monitoring, waste treatment, end-of-pipe recycling and disposal, and environmental management not directly related to site restoration, but related to meeting current and future environmental compliance requirements. It included understanding the fate and transport of defense related wastes and pollutants as well as methods and techniques for mitigating ecological and health impacts of these materials in the environment.

### Conservation

This area is focused on research toward understanding, protecting, and maintaining biophysical resources and facilities relative to natural and cultural resources in order to ensure: (1) compliance with environmental laws; (2) sustained use of land and coastal resources; and (3) support for stewardship of those resources on relevant Federal lands. Those resources include all biophysical resources associated with and related to ecosystems and habitat, e.g., soils, vegetation, landform, water and biodiversity; and facilities and landform associated with historic and archeological resources. Efforts were intended to: (1) effectively predict the presence, quantity and quality of natural and cultural resources; (2) improve the knowledge of the basic processes of these resources as they relate to, and are impacted by, use of lands; and (3) advance the technology to mitigate, rehabilitate, and maintain these resources.

## Renewable Energy/Energy Conservation

This area addressed the generation, transmission, use, and conservation of energy. DoD is the single largest user of energy in the world, with an annual energy consumption of more than 150 million barrels of oil equivalent at a yearly cost of more than \$3.2 billion. The goals of this thrust area are to optimize the utilization of present energy sources; determine applicability of alternate energy sources for present energy usage systems and processes; and seek and/or develop replacements for present fuels with the specific goal being a renewable resource. Alternate/clean energy included research on environmentally sound alternative energy sources to reduce dependence on petroleum-based sources, overall energy consumption, energy costs and greenhouse effects.

## Global Environmental Change

This Thrust Area focused on research which included acquisition/organization of data and research results that quantitatively described the total environment at global and regional scales. Integration of the new and existing programs in data collection and analysis methodologies, process study research and environmental modeling were keystones of this effort capitalizing on agency unique capabilities that fully leveraged the U.S. Global Change Research Program (USGCRP).

Global Environmental Change included improving access to existing DoD and DOE data bases and facilities; developing, demonstrating, and applying DoD, DOE, and EPA remote sensing capabilities and technologies to support environmental change research and establish enhanced observation strategies and systems; and enhanced environmental process research and modeling. This area also focused on the employment of the DoD/DOE technical advantage and infrastructure toward understanding major environmental issues and recognizing the potential dual use application of this research, as directed by the SERDP authorizing language.

## Pollution Prevention

This Thrust Area focused on research which addressed new Pollution Prevention measures, tools, and/or strategies. Pollution Prevention means "source reduction," as defined under the Pollution Prevention Act of 1990 and other practices that reduce or eliminate the creation of pollutants through increased efficiency in the use of raw materials including energy, water and other resources, or materials substitution. The term includes: equipment or technology modifications, process or procedure modifications, reformulation or redesign of products, substitution of materials and improvements in housekeeping, maintenance, training, or inventory control. Under the Pollution Prevention Act, end-of-pipe recycling, energy recovery, treatment, and disposal are not included within the definition of pollution prevention. Practices commonly described as "in-process recycling" qualify as pollution prevention.

## PROPOSALS REVIEWED AND RECOMMENDATIONS

All proposals considered by the SAB during FY94 and the recommendations for each are outlined in Appendix B. In summary, the SAB received and reviewed 35 proposals, totaling a requested value of \$108.376 million. The SAB declined to recommend for funding seven projects requesting \$9.856 million. Additionally, as a result of SAB recommendations, \$1 million in requested project funding was directed to other efforts. Thus, as a result of SAB deliberations during FY94, \$10.856 million was identified for redistribution to other focused, appropriate SERDP projects.

## SUMMARY

The SERDP Scientific Advisory Board represents a diverse membership from the scientific community whose professional backgrounds and areas of expertise provide an unbiased and forward-looking perspective in the evaluation of proposals. The SAB encourages coordinated efforts by the Department of Defense, the Department of Energy, and the Environmental Protection Agency in successfully meeting their environmental challenges and obligations. It is intended that the SAB be totally integrated within the SERDP management structure and therefore instrumental to establishing and appropriately focused R&D program. The issues include, but are not limited to, recommendations in the project selection process, areas ripe for technology development, technology transfer between private industries and governmental agencies, feasibility and applicability of using federal data resources for environmental purposes, and overall strategy formulation and program management issues. This group of high-level, dedicated, environmental professionals, acting in an advisory capacity, ensures that duplication of effort is minimized between participatory agencies and that the SERDP Council is investing scarce resources wisely.

The Scientific Advisory Board has been, and will continue to be, an active and concerned partner in the effort to enhance the agencies' and Services' capabilities to meet their environmental commitments, to encourage technology transfer and collaborative efforts, and to focus on methods to meet the environmental challenges of the future.

During FY95, the SERDP Scientific Advisory Board will continue to assist the SERDP Council to effectively address environmental matters of concern to the Department of Defense and the Department of Energy. It is anticipated that the Board will play a more proactive role in program review and development. In fact, the SAB members were requested to review and comment on the SERDP FY95/96 Strategic Guidance, which lays out SERDP's goals and objectives in the near future. Dr. Marvin Moss, speaking as a representative of the entire SAB, commented that the "SERDP Strategic Guidance is formulated to focus development of the FY 95 and FY 96 programs. A technical strategy has been developed and laid out, and each Thrust Area of SERDP has general or overall objectives, major environmental concerns, more specific R & D objectives and, in some

cases, annotated thrust areas that will be considered for expanded funding. This strategic guidance is new, and the SAB has not had time to fully digest its final form. Based on my discussions with the SAB members, I do not believe that the SAB will have major comments or concerns with the strategic guidance document. Indeed, it is a necessary document and, I believe, well suited to serve the needs of SERDP over the next year."



## APPENDIX A -- SCIENTIFIC ADVISORY BOARD MEMBERSHIP

### **Moss, Marvin K., SAB Chairman**

Current Position: Provost and Vice Chancellor for Academic Affairs, The University of North Carolina at Wilmington.

Degree: Ph.D., Physics, North Carolina State University, 1961.

Previous Positions: Associate Vice-Chancellor for Marine Sciences, University of California, San Diego, and Deputy Director, Scripps Institution of Oceanography. Director, Office of Naval Research; Associate Director, Office of Energy Research, DOE; Director, Nuclear Division, U.S. Arms Control and Disarmament Agency; Professor of Physics, North Carolina State University.

Awards: Executive Committee, International Ocean Drilling Program; American Association for the Advancement of Science; American Geophysical Union; Atomic Energy Commission (Fellow); NSF Senior Post-Doctoral Fellow, Tait Institute of Mathematical Physics, University of Edinburgh and Imperial College, University of London; IAEA International Nuclear Fuel Cycle Evaluation Committee; Presidential Rank Meritorious Government Executive, 1985; U.S. Navy Distinguished Civilian Service Award, 1987.

### **Weber, Walter J., Jr., SAB Vice Chairman**

Current Position: The Gordon M. Fair and Ernest Boyce Distinguished University Professor; Director, Environmental and Water Resources Engineering; Director, the Great Lakes and Mid-Atlantic Center for Integrated Substance Research; Executive Director, the National Center for Integrated Bioremediation Research and Development, Univ. of Mich.

Degree: Ph.D., Water Resources Engineering, Harvard University, 1962; A.M., Environmental Chemistry, Harvard University, 1961; M.S.E., Environmental Engineering, Rutgers University, 1959; Sc.B., Chemical Engineering, Brown University, 1956.

Previous Positions: Chairman, Univ. Program in Water Resources, Univ. of Mich. (1968-1992); Visiting Professor, University of California at Berkeley and University of Melbourne, Australia, 1971.

Professional Activities: Member, American Academy of Environmental Engineers, American Chemical Society, American Institute of Chemical Engineers, Association of Environmental Engineering Professionals, American Society of Civil Engineers (Fellow), American Water Works Association (Fellow), Inter. Assoc. for Water Quality, Water Environment Federation.

Awards: Dist. University Professorship, Univ. of Mich., since 1994; Dist. College Professor, Univ. of Mich., 1987-1994; Dist. Scientist Award, U.S. EPA, 1991; Dist. Faculty Award, State of Mich., 1989; Stephen S. Atwood Award for Engineering Excellence, Univ. of Mich., 1987; Member of the National Academy of Engineering, since 1985.

Author or co-author of three books and approximately 300 peer-reviewed technical publications.

**Colwell, Rita R.**

Current Position: President, Maryland Biotechnology Institute and Director, Center of Marine Biotechnology, University of Maryland.

Degrees: Ph.D., University of Washington.

Previous Positions: Professor of Microbiology, Vice President for Academic Affairs, and Director, Sea Grant College, University of Maryland; Associate Professor of Biology, Georgetown University.

Professional Activities: Chairman, Board of Governors, American Academy of Microbiology; Member, National Association of Marine Laboratory Directors; Vice Chairman, Polar Research Board, National Academy of Sciences; Member, Mathematical Sciences Education Board, National Research Council.

Awards: Distinguished Scientist and Lecturer Award, Society for Experimental Biology and Medicine, 1979; Tenth Annual Sea Grant Lecturer and Research Award, MIT, 1982; Fisher Award, American Society for Microbiology, 1985; Gold Medal Award, International Institute of Biotechnology, 1990.

Author or co-author of 14 books, 47 book chapters (since 1984) and 165 articles (since 1983).

**Conway, Richard A.**

Current Position: Senior Corporate Fellow, Union Carbide Corporation.

Degree: M.S., Environmental Engineering, MIT, 1957.

Previous Positions: Corporate Fellow, Development Associate, Group Leader, and Development Engineer, Union Carbide Corporation.

Professional Activities: Member, National Academy of Engineering; Member, Science Advisory Board, EPA; Member, Committees on Engineering and Technical Systems, National Research Council/National Academies of Sciences and Engineering; Chairman, Hazard Assessment Study Group, International Association on Water Quality.

Awards: Outstanding Leadership Award, ASTM Committee D-34 on Waste Disposal; Award for Personal Achievement in Chemical Engineering, Chemical Engineering, 1986; Dudley Medal, ASTM, 1984; Special Service Award, ASTM Committee D-34, 1983; Rudolfs Award, Water Pollution Control Federation, 1983; State-of-the-Art Civil Engineering Award, American Society of Civil Engineers, 1975; Rudolfs Award, Water Pollution Control Federation, 1974; Hering Award, American Society of Civil Engineers, 1974; Gascoigne Award, Water Pollution Control Federation.

Author or co-author of one book, twenty publications, and editor/co-editor of eight books.

**Eno, Amos S.**

Current Position: Executive Director, National Fish and Wildlife Foundation, Washington, DC.

Degree: B.A., Princeton University, 1972, M.A., Cornell University, 1977.

Previous Positions: Director, Conservation Programs, National Fish and Wildlife Foundation; Director, Wildlife Programs, National Audubon Society; Special Assistant to the Chief, Office of Endangered Species, U.S. Fish and Wildlife Service; Special Assistant to Assistant Secretary of Interior for Fish, Wildlife, and Parks.

Professional Activities: Consultant/Production assistant to National Audubon Society's TV specials and to WTBS for wildlife films; Consultant to President's Commission for Americans Outdoors; North American Wetlands Council; Director, North Atlantic Salmon Fund; Advisor LSNET New York.

Author of FY89-96 (annual) Federal Agency Needs Assessments, four Audubon Wildlife Reports, and Crossroads: Environmental Priorities for the Future; co-author, Wolf Recovery in the Northern Rocky Mountains.

**Gade, Mary A.**

Current Position: Director, Illinois Environmental Protection Agency.

Degree: B.A., University of Wisconsin, 1974; JD, Washington University School of Law, 1977.

Previous Positions: Deputy Assistant Administrator of U.S. EPA Office of Solid Waste and Emergency Response; U.S. EPA Associate Division Director for Superfund, Waste Management Division; U.S. EPA Deputy Director, Waste Management Division; U.S. EPA Associate Regional Counsel, Office of Regional Counsel; U.S. EPA Assistant Regional Counsel, Office of Regional Counsel; Instructor, Roosevelt University's Geography Department.

Professional Activities: U.S. Representative to Canadian Law Reform Commission's Environmental Subcommittee (1989-1991); Mentor, University of Chicago, Irving B. Harris School of Public Policy; Advisory Committee for Santa Fe Council for Environmental Excellence; Board of Directors of Women Executives in State Government; Illinois Advisory Council of Leadership; National Governor's Association; National Environmental Policy Institute; Membership on various EPA workgroups and task forces.

Author or co-author of over 10 articles from 1987 to 1994, presented 9 speeches since 1990.

**Ostenso, Ned A.**

Current Position: Assistant Administrator for Oceanic and Atmospheric Research and Chief Scientist, National Oceanic and Atmospheric Administration (NOAA).

Degrees: Ph.D., University of Wisconsin, 1962.

Previous Positions: Deputy Assistant Administrator for Research and Development and Director of the National Sea Grant College Program; Deputy Director and Senior Oceanographer of the Ocean Science and Technology Division, Office of Naval Research; Assistant Presidential Science Advisor in the Office of Science and Technology of the Executive Office; Faculty, University of Wisconsin, Department of Geology and Geophysics.

Professional Activities: Member of numerous scientific professional associations and advisory committees; Johns Hopkins School for Advanced International Studies; American Political Science Association Fellow in the U.S. Senate and U.S. House of Representatives, where he developed the National Earthquake Hazard Reduction and National Climate Program Acts; Woods Hole Oceanographic Institution; the Lamont-Doherty Geological Observatory of Columbia University; the Arctic Institute of North America.

Awards: Meritorious Service Award from the Department of Defense, the Navy Department, and the National Academy of Sciences; Mountain in Antarctica and a seamount in the Arctic Ocean named after him.

Author of over 50 published scientific research papers.

**Parker, Frank Leon**

Current Position: Distinguished Professor of Environmental and Water Resources Engineering, Vanderbilt University.

Degree: Ph.D., Harvard University, 1955.

Previous Positions: Professor of Management of Technology, Vanderbilt University; Senior Research Associate, Vanderbilt Institute of Public Policy Studies;

Professional Activities: Chairman, Environmental Advisory Committee, Pennsylvania Power and Light Company; Chairman, Board of Radioactive Waste Management, National Academy of Sciences (NRC); Leader, National Academy of Sciences Delegation to the Soviet Union on Cooperation in Radioactive Research and Management.

Awards: The Alexander Heard Distinguished Service Professor, 1988-89, and appointment as a Senior Research Fellow, The Beijer Institute, The Royal Swedish Academy of Sciences, 1984-1987.

Co-author of three books, co-editor of two books, author or co-author of 25 book chapters and 40 journal articles.

**Ryan, Michael J.**

Current Position: Manager of Technology, Bechtel Environmental, Inc.

Degree: Ph.D., Environmental Engineering, University of North Carolina, 1975.

Previous Positions: Senior Vice President, Metcalf & Eddy Inc.; Executive Vice-President, ICF Technology Inc.; Chief of Environmental Policy, USAF (Pentagon); Director of Environmental Engineering and Industrial Hygiene, HQ Strategic Air Command; Director, Environics R&D Program, AFESC.

Professional Activities: Consultant to the USAF Surgeon General; Member, USAF Engineering and Services "Future Vision" Panel; Professional Engineer (Texas); Board Certified Industrial Hygienist; candidate Diplomat to American Academy of Environmental Engineers.

Author or co-author of ten articles or other publications since 1985.

# APPENDIX B -- PROPOSALS AND RECOMMENDATIONS

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<p><b>CU-428: Ground Water Cleanup of Organic Contaminants Using Methanotrophic Bioreactors (DOE)</b>  <b>\$1,600K</b></p>	<p style="text-align: center;"><b>CLEANUP</b></p> <p>The general objective of this project is to demonstrate innovative technologies with potential for application to the DoD and DOE-DP waste management program. The specific goal is to develop and implement an environmental project for demonstrating/evaluating the potential of bioreactor bioreclamation for cleanup of deep subsurface contamination from disposal of chlorinated hydrocarbons in unlined waste disposal facilities. The targeted department/organization is DoD and DOE since chlorinated solvents were disposed of in unlined facilities at all manufacturing and maintenance sites operated by DoD and DOE. Virtually all sites were metals processing (including nuclear production) and metals degreasing operations, e.g., airports, air bases, dumped large quantities of these solvents on the ground over 40 or more years. Since these solvents have been found to be carcinogenic at low concentrations in drinking water maximum allowable concentrations in drinking water are as low as 5 ppb. Thus DoD/DOE, and virtually the entire industrialized world are faced with a very large number of chlorinated solvent contaminated aquifers that will be required (regulatory mandates) to be cleaned up to very low concentrations.</p>	<p>(January) The Board commended Dr. Hazen for effectively developing this technology effort through to the commercialization stage. They did not, however, recommend this proposal for FY94 funds. Having recently received FY93 funds, Dr. Hazen was asked to redirect FY93 dollars to optimize one reactor system and to prepare it for transfer to industry.</p> <p>(March) In an action similar to their recommendation from the January meeting, the Board voted to decline FY94 funds and to redirect FY93 funds to test this technology in one or two applications for the purpose of facilitating technology transfer and consumer evaluation. The Board encouraged aggressive attempts to commercialize this technology and felt that FY93 funds should be sufficient to do so. If FY93 funds prove to be inadequate for that purpose, the Board agreed to reevaluate this proposal in FY95 or earlier, if necessary.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
CU-115: Toxicology and Human Health Risks (USAF) \$1,700K	Chemical contamination of groundwater and soil is a national problem which consumes extensive technological and financial resources. Cleanup levels are determined on the basis of risk calculations, usually requiring extrapolation from laboratory animal studies. Determining acceptable levels for humans from animal studies is a conservative, policy driven process that involves extrapolation and interpretation of scientific findings. Scientific uncertainties in this process are often compensated for by conservative assumptions that result in lower cleanup levels with inherent increased costs. Current costs to clean up to the low ppb range in water and soil are in the hundred of millions of dollars. TCE, tetrachloroethylene, and other volatile organics are priority groundwater contaminants for DoD and the US EPA. These chemicals often greatly exceed current risk-based cleanup levels at Superfund landfill sites. It has been estimated that for 125 Air Force sites with TCE contamination, raising the drinking water standard from 5 to 50 ppb would save \$620 million. This project is designed to further the development of newer risk assessment methodologies for developing reasonable health protective criteria for important groundwater contaminants for use in establishing cleanup requirements.	<p>(January) The Board appreciated the good science being conducted in this joint effort. The members believed that while understanding past exposures to toxic substances was a necessary part of a continuing program, it fell short of meeting the needs of SERDP. More specifically, the proposal did not address future issues that may arise due to residential contaminant exposure. A revised proposal should be submitted focusing on providing the risk assessment tools that will assist in achieving remediation goals and lowering their associated costs prior to remedial action. A realistic goal should be to assess fate and effects of specific contaminants in order to increase the exposure limits and acceptable concentrations in soil and/or water, thereby reducing the overall costs of remediation. These tools should take advantage of some of the ongoing exposure modeling, as well as previous and new efforts in this area. This proposal may return for rebriefing at the March meeting.</p> <p>(March) The Board felt that their concerns from the January meeting were adequately addressed in this rebriefing. The Board cautioned the proposers on their assumption that the acceptable TCE exposure limit will necessarily go up as a result of this research. The SAB recommended approval for this project at \$1.4M, as modified by the Principal Investigator.</p>
CU-052: Mobile Underwater Debris Survey System (Navy) \$1,400K	The goal of the MUDSS project is to demonstrate the technologies necessary for underwater surveys of shallow water inland and coastal sites littered with ordnance. A successful demonstration will prove the concept of a trailerable, low-maintenance, catamaran-based system capable of finding and mapping the locations of ordnance ranging from small shells to large bombs in water depths of from four to forty feet. MUDSS will supply the object detection and classification technology necessary for the environmental cleanup of ordnance at scores of underwater ordnance litter sites.	<p>(March) The Board complemented the presenter on the high quality of this presentation and appreciated the need for techniques to remediate coastal sites littered with unexploded ordnance, such as the case of Kahoolawe, HI. They unanimously recommended approval of this project as presented.</p>
CU-718: Simulation of the Impacts of Subsurface Heterogeneities on Remediation Effectiveness (Army) \$2,850K	All natural soils are heterogeneous. These heterogeneities significantly affect the transport and fate of contaminants in the subsurface on many scales, thereby exerting a primary controlling influence on contaminated groundwater remediation effectiveness. The goal of this research is the improvement of contaminated groundwater resource cleanups on DoD/DOE installations through development of simulation models that predict the impacts of subsurface heterogeneities on remedial effectiveness.	<p>(March) The Board members expressed concern that this project, which was funded in FY93, was attempting to address too many peripheral issues rather than focusing on the macro-scale effects of heterogeneities on remediation effectiveness. As a result, the Board recommended no additional funding at this time and further recommended that the Principal Investigator refocus the remaining FY93 funds on the issue of scaling, which is a primary concern regarding heterogeneities. The project's advisory board should be solicited to refocus the project on the critical issues.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
CU-368: Aquifer Restoration by Enhanced Source Removal (EPA) \$2,200K	The goal of this project is to provide field demonstrations of innovative processes to remediate aquifers contaminated by non-aqueous phase liquids (NAPLs) including fuels, solvents, and other organic contaminants in a timely and cost-effective manner. Low-solubility organics, such as chlorinated solvents, were used and released to the environment in massive quantities during the 1950's, 60's and 70's. These contaminants have migrated through the subsurface and have entered ground water at over 2000 DoD sites. The objective of this research is to demonstrate processes for enhancing contaminant removal (enhanced pump-and-treat technologies) in a variety of geologic settings (at Hill AFB in Utah) and to produce engineering design guidance documents for applying these processes to remediate contaminated ground water.	(January) The SAB recommended approval of this continuing project and commended Dr. Enfeld for his efforts to date. Their only concern regarded the transferability of this technology to other sites since the demonstration was to be conducted under specific hydrogeologic conditions.
CU-717: Hazard Assessment Techniques and Biomonitoring (Army) \$1,745K	The assessment of potential hazards to human health and ecological receptors posed by complex environmental contamination drives the cleanup and compliance decisions made by Federal risk managers. From site prioritization to remediation efficacy demonstration to long term monitoring required by Federal law, the question of how we decide what is "clean" is the central determinant in decisions affecting the annual expenditure of billions of dollars. The opportunity to more realistically define these hazards, however, would optimize the expenditure of limited remediation resources and enhance the confidence of risk managers and the public regarding the efficacy of cleanup activities. The goals of this effort are to (1) provide environmental program managers with more relevant data and decision tools for the determination of potential hazards posed by exposure to complex chemical contamination of the environment at DoD, DOE, and EPA managed sites, and (2) develop a suite of biological hazard assays to be applied to environmental remediation.	(January) The Board members of the SAB were uncomfortable with this project's six separate technology efforts and their ability (or inability) to merge upon completion of the effort. The Board recommended this new start proposal for funding; however, they advised Dr. Gardner to pay sufficient attention to the integration effort. Likewise, the Board would like to see sufficient progress at the end of the year's work to evaluate the ability of this project to develop an effective "toxicity meter."
CU-374: Consortium for Site Characterization Technology (EPA) \$900K	Historically, the emergence and use of innovative technologies has been slow. Further, the costs of characterizing sites approaches one third of total costs. The goal of this project is to facilitate the development, demonstration, and use of innovative site characterization technologies through a new, consortium process. This consortium will consist of partnerships among DoD, DOE, and EPA representatives and will seek to identify, validate, and encourage the use of cost-effective site characterization techniques.	(January) The members of the Board unanimously rejected this proposal for FY94 funding. While coordination of the investigation and standardization of characterization technologies is desirable, the Board did not see the benefit of SERDP creating an additional layer of management to impede this effort. Furthermore, they recommended that the FY93 funds should be redirected to investigate means to improve the standardization and acceptance process within EPA. Subsequent to this recommendation, the proponents of this effort were integrated into the DoD National Environmental Technology Demonstration Program, where their contributions would have immediate and significant impact on planned and ongoing demonstrations.



TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<p><b>CU-720: Integrated Biotreatment Research Program (Army)</b> <b>\$2,450K</b></p>	<p>This project represents a collective research initiative by several key governmental and academic organizations with a long history of developing treatment technologies. The ultimate goal of this program is to perform research efforts that will result in the fielding of several biotreatment processes for remediation of predominant DoD contaminants. The proposed experimental approach will be to first investigate a variety of promising biotreatment techniques at the bench scale. During performance of bench activities, engineers with design and implementation experience will assess the overall implementation potential and projected costs associated with these techniques. Upon completion of the bench efforts, several small scale pilot studies will be performed using those techniques considered most promising. After performance of the intermediate scale studies, at least four of the most economically and technically sound processes will be evaluated on the field pilot scale at actual DoD sites.</p>	<p>(January) The SAB was generally pleased with the concept of this integrated effort except that there was insufficient detail in the description of milestones, their tasks, and associated costs. The Board requested further clarification be provided in the FY94 milestones, the current state-of-the-art of the effort, which milestones/tasks are funded by SERDP, and the amount of funds required for these tasks. Specifically, differentiate between integration/administrative costs versus R&amp;D efforts. This information is requested before the next meeting.</p> <p>(February) Mr. Zappi provided the Board with detailed program information in response to their questions from the previous SAB meeting. The Board recommended approval of \$2.45 million effort and will monitor the integration of this effort with other similar biotreatment projects.</p>
<p><b>CU-729: Accelerated Tri-Services SCAPS Sensor Development (Army)</b> <b>\$3,375K</b></p>	<p>Currently, site characterization represents a significant portion of remediation efforts, accounting for approximately one-third of the total costs. Environmental site characterization has been traditionally based on drilling, sampling, and laboratory analysis. This traditional approach to site characterization hampers remediation efforts because of its uncertainty, time requirements, and cost. The Site Characterization and Analysis Penetrometer System (SCAPS) was developed to address many of these deficiencies. SCAPS combines traditional cone penetrometer technology with contaminant and geophysical sensors to rapidly provide a profile of contaminants and geophysical properties in a cost effective manner. In order to maximize their payoff in future remediation efforts, it is critical that environmental sensors be developed to characterize sites containing metals, POL's, solvents, explosives, and radioactive contaminants. This proposal addresses the need to accelerate the research, development, and demonstration of sensor, sampling, and associated data processing technologies for SCAPS.</p>	<p>(February) In the absence of a quorum, the Board agreed to recommend approval of this project contingent upon receipt of additional information by the next meeting. Compelling reasons as to why the demonstration efforts of SCAPS cannot be conducted at established test sites under the DoD Environmental Technology Demonstration Program should be provided. Otherwise, these demonstration sites should be used and such plans reflected in the proposal. Furthermore, a peer review group that has no vested interest should be formed to provide an international/scientific perspective. This group should include membership from the EPA Centers that have experience in developing monitoring technologies.</p> <p>(March) The Board ratified their decision from the previous meeting. The requested information was provided, and a peer review group was formed.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<p><b>CU-726: Peroxone Treatment of Contaminated Groundwater (Army)</b> <b>\$950K</b></p>	<p>Peroxone oxidation is a groundwater treatment technology that has great potential for treating contaminated groundwaters at greatly reduced treatment costs. Peroxone is a chemical oxidation process that has been used primarily for treatment of drinking water in both the United States and Europe. The process involves the addition of ozone (O<sub>3</sub>) and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) into a reactor system containing the contaminated groundwater. Peroxone generates hydroxyl radicals (OH<sup>•</sup>) through the reaction of ozone with hydrogen peroxide. The hydroxyl radical is a powerful oxidizer that can destroy organic compounds into environmentally safe compounds. The overall objective of this project is to accelerate development of peroxone oxidation processes for treatment of explosives contaminated groundwaters.</p>	<p>(February) In the absence of a quorum, the Board concurred with the technical and management approach of this continuing project that seeks to effectively deal with energetic contaminants. Accordingly, they recommended approval at the \$950K funding level.</p> <p>(March) The Board ratified their decision from the previous meeting.</p>
<p><b>CU-723: National Environmental Test Sites Program (Army)/Navy/Air Force/EPA)</b> <b>\$8,220K</b></p>	<p>The current process for gaining acceptance of cost effective innovative technologies for the cleanup of federal installations is laborious and costly. The problem stems from several causes, including the lack of formally established technology demonstration programs ensuring protocols and quality assurance/quality control procedures sufficient to meet requirements of regulators and users, and information dissemination in formats suitable for all interested parties. These causes can be addressed by a comprehensive technology demonstration/evaluation/transfer program. This project provides such a comprehensive technology demonstration/ evaluation transfer program. The goal is to provide locations for comparative demonstration and evaluation of cost effective and innovative technologies to enable transfers from research to full-scale use. When fully operational, the Test Sites Program will provide at least five different demonstration locations in a wide variety of geologic and contaminant settings, all fully characterized. These sites will include a Fuel Hydrocarbon site located at Port Hueneme, California, an organic contaminants site, located at the Wurtsmith AFB in Michigan, an energetics test site, located at Volunteer Army Ammunition Plant (AAP) in Tennessee, a solvents test site located at McClellan AFB in California, and a controlled release site, which is yet to be identified.</p>	<p>(February) In the absence of a quorum, the Board acknowledged the overall importance of this effort to facilitate technology demonstration and transfer to industry. However, it is clear that an effort of this magnitude demands increased scrutiny. The success of this project is essential since it represents a cornerstone of SERDP and places the credibility of the SERDP development and review process on the line. The Board raised several concerns; namely, that this project is very expensive and that the presentation lacked sufficient cost accounting detail. Accordingly, the Board recommended approval of FY94 funding but requested for the mid-year review: (1) a detailed cost accounting of all expenditures per year by task, and (2) a statement describing the developed partnerships and the linkages to present and future SERDP demonstration projects/proposals. The Board also encouraged the Test Sites program to publicize its work and recognize SERDP as its funding source in published documents. Further, the Board requested periodic performance information throughout the execution year to maintain a complete understanding of the progress of this pivotal project.</p> <p>(March) The Board ratified their decision from the previous meeting.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<p><b>ETF-004: Environmental Characterization Via Remote Sensing (Army)</b> <b>\$2,000K</b></p>	<p>Hazardous wastes are often not directly detectable but their presence may be inferred from vegetation stress responses or soil discolorations. As such, environmental characterization may require new/improved remote sensing technologies, including methods that integrate remotely sensed imagery and Geographic Information Systems (GIS). The goal of this project is therefore to develop cost-effective remote sensing methodologies for characterizing hazardous waste sites.</p>	<p>(February) The Board acknowledged the proposer's knowledge and interest in remote sensors but failed to see the effective use of these sensors for contamination characterization of any areas other than surface settings, which can be done by means other than remote sensing. Yet, the Board agreed that this technology warrants further investigation to examine spectral characterization and its overall contribution to characterization of contaminated sites. The Board invited the proposer to submit a revised proposal which should include (1) evidence of or a plan for the spectral characterization research, and (2) a description of the relevance of this information with overall contamination problems. According to the discretion of the Executive Director, the presenter may or may not have to attend the next meeting. Subsequently, this proposal was not deemed sufficiently focused by the Council to be considered in the FY94 Program.</p>
<p><b>CU-030: In-situ Bioremediation of Fuel and Efficacy Monitoring (Navy)</b> <b>\$2,450K</b></p>	<p>In the U.S., the frequency of occurrence of fossil fuel contamination is greater in magnitude than that reported for chlorinated solvent pollution. Given the scope and magnitude of these environmental contamination problems, bioremediation often represents the only practical and economically feasible solution. We have developed and refined innovative in-situ bioremediation strategies including approaches using stable carbon and nitrogen isotope geochemistry to monitor progress during in-situ bioremediation of polycyclic aromatic hydrocarbons (PAHs) and other priority pollutants (e.g., BTEX). Approaches in stable isotope geochemistry may allow one to monitor progress of the bioremediation effort by tracing the fate of individual compounds of interest: including bacterial assimilation and respiration, formation of toxic intermediates, and transport of the compound from the site. With this information, a mass balance for a contaminant may be conducted and the efficacy of various bioremediation approaches may be tested. This project's objective is to demonstrate the usefulness of innovative in-situ bioremediation technologies by introducing inoculants and maintaining their activity in the field. The project approach is to develop the treatment strategy, employ the biotreatment in small-scale laboratory tests, and finally in a large-scale field demonstration. This project has three unique thrusts: development of techniques for measuring effectiveness of bioremediation treatments; integration of multiple technologies for treatment strategy; and use of bacterial encapsulation and inoculation for enhancement of PAH degradation in the field.</p>	<p>(January) The Board expressed concerns about the technical approach that links a unique monitoring technology development with a specific, versus generic, bioremediation system demonstration. These concerns included the potential for project delay due to possible patent issues and restricted government access to this technology. The Board asked Capt. Schultz to return in February with a revised proposal that isolates the monitoring technology issues from the ground water circulation wells (UVB systems). Detailed information should be provided that clearly delineates the tasks and associated costs within the two efforts and better articulates the need to link these separate R&amp;D efforts.</p> <p>(February) In responses to questions asked at the previous meeting, the SAB acknowledged that all previous patent concerns have been resolved; however, several issues remain. Although the Board recommended approval, they requested a revised project plan to be submitted to Dr. Oswald. The Board also requested a revised budget to include a line item for the "new" monitoring technique and specifics on each task, milestone, and associated labor costs using consistent definitions of O&amp;M and Overhead. Furthermore, a coordination plan should be developed linking this project with CU-720: (Integrated Biotreatment Research Program), CU-428: (Ground Water Cleanup of Organic Contaminants), and CU-723 (National Environmental Test Site Program).</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
CP-035: Supercritical Water Oxidation of Organic Wastes (Navy) \$900K	<p>The overall goal of this project is to determine if supercritical water oxidation (SCWO) is an effective treatment for certain DOE and DoD organic waste streams. The DOE has a very large amount of organic wastes, such as cutting oils and solvents, that have been contaminated with radioactive materials. The problem for the DOE is to determine if, through oxidation of the organic portion of the waste into nonhazardous water and carbon dioxide, SCWO can reduce the volume of radioactive material that must be stored while separating out the radioactive elements. The Navy generates about 10,000 tons per year of hazardous organic materials such as waste oils, solvents, cleaners, and paint; Army industrial activities generate about the same amount of organic wastes; while Air Force industrial activities generate substantially less. The problem for the DoD is to determine if SCWO is a technically and economically viable method of destroying organic wastes generated by industrial activities. In addition to high disposal costs, the DoD retains legal liability for proper disposal of these wastes. This project will demonstrate, at pilot scale, the use of supercritical water oxidation as a method of destroying organic hazardous wastes generated by DoD industrial activities. In addition, the project will demonstrate the destruction of organics in simulants of wastes generated by the DOE and gain an understanding of the fate of radionuclides in an SCWO system.</p>	<p>(January) The Board recalled the issues surrounding the proposal in FY93 and commended Mr. Kirts for his efforts which followed the recommendations of the SAB. However, they expressed concerns regarding commencing a Phase II design effort prior to completion of Phase I. The SAB maintains that Phase I is essential to properly design a larger, reliable prototype. Even though the proposal identified using non-SERDP funds for hardware development, the Board (without prejudice) did not recommend funding this proposal until Phase I has been completed. They welcomed Mr. Kirts to resubmit a Phase II proposal upon incorporating the results of Phase I.</p> <p>During the interim period between the first and second SAB meetings, the Executive Director and Mr. Kirts agreed upon a modified approach to this effort that was consistent with the Board's advice. Specifically, \$346K is recommended to prepare for the proposed Phase II effort upon completion of Phase I. The Executive Director promised to provide a revised proposal to the Board for review.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<p><b>CP-523: Controlling, Assessing, Managing, &amp; Monitoring the Noise Impact from Weapons, Helicopters, and Aircraft on Training and Readiness (Army)</b>  <b>\$1,250K</b></p>	<p>Preservation of the Department of Defense (DoD) training, testing, and readiness mission requires that DoD be capable of controlling, assessing, managing, and monitoring noise problems in the vicinity of its bases and installations. They cannot now consistently do this. The direct impact is an insidious loss of training and readiness capability through the closure of ranges and firing points, altered flying, and nighttime curfews. Because of noise, the DoD has lost significant mission capability at over 50 installations. Equally important are delays due to procedural or litigational challenges (as provided for in the National Environmental Policy Act) to environmental impact analysis documents that propose changes in DoD operations. These challenges are difficult to refute when substantiating information is not available. It is expected that the impacts of environmental noise from military operations will continue to be a significant problem, and with enhanced emphasis on nighttime training, will worsen for the foreseeable future. The major focus areas of this effort are a combined human effects model, noise propagation research, and an improved physical prediction model. The combined human effects model is a dose response empirical model that will provide the means for DoD to assess and mitigate noise. The propagation research will lead to better analytical physical sound propagation models, which will be used to improve the underlying physical predictions of sound for the human effects model.</p>	<p>(February) The members of the SAB agreed that the impact of impulse noise on human and animal response deserves adequate attention; however, this proposal as written did not adequately describe the technical approach in this modeling effort, nor did it appear to incorporate accomplishments of the previous Air Force (AMRL) investments in this area. The Board requested that the presenters return to the next meeting with a revised proposal which articulates and incorporates the ongoing complementary work of other organizations, as well as related work that has previously been conducted.</p> <p>(March) The Board appreciated the presenter's responses to their concerns from the previous meeting; however, they disagreed with the presenters that noise may have an impact on animal response. Dr. Schoner explained that, while he and his colleagues agree with the SAB on this issue, the public demands to see quantitative data to provide assurances that, in fact, threatened and endangered species are not adversely affected by impulse noise. The SAB rejected a motion to fund this project in FY94; however, the Board agreed to ask the Executive Director to consider the potential for funding the first two aspects of this proposal: i.e. the combined response modeling and turbulence effects efforts. These two project elements were funded in FY94 at \$550K after a focused proposal was resubmitted to the Executive Director.</p>
<p><b>CP-082: e-Scrub - the Application of DNA Pulsed Power to Electron Scrubbing of Flue Gas to Remove Unwanted By-Products (DNA)</b>  <b>\$2,600K</b></p>	<p>The goal of the e-SCRUB program is to demonstrate that the High Power Transformer Accelerator (HPTA) technology, originally developed for military applications, can be applied to environmental compliance. This goal includes the integration of the HPTA technology into the electron beam dry scrubbing (EBDS) process to demonstrate a cost effective process for removing: (1) SO<sub>2</sub> and NOx from flue gas emitted from boilers burning high sulfur fuel; and (2) SO<sub>2</sub>, NOx, and air toxins from incinerators burning municipal solid waste.</p>	<p>(March) The Board members were unanimously concerned by this project's overruns of ten months and approximately \$2M, but they felt equally committed to this effort due to the potential payoff, as well as the substantial SERDP investment in the past (\$6.833M). The Board therefore recommended funding this project at \$1.3M in FY94 to complete Phase I. Phase II should not commence until the results of Phase I are released. At that time, the project will be reevaluated. The SAB volunteered to convene a special meeting, if necessary, to review Phase I results and the proposed Phase II efforts in order to facilitate follow-on funding.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
CP-034: Compact, Closed- Loop Controlled Waste Incinerator (Navy) \$1,000K	A new generation of incinerators based on recently developed active ramjet-combustion control is required for ship-board waste disposal to enable Navy ship access to ports and bodies of water around the world without operational constraints from environmental laws and regulations. Thermal destruction is considered the ultimate solution beyond year 2000 for all types of waste, including trash, garbage, plastics, medical and hazardous wastes. Present commercial incinerators are typically unsuitable for Navy shipboard installation and operation because they are oversized and often do not meet incineration standards, particularly at off-design operation. For ship-board use, compact (small size) incinerators with assured (pollution-free) waste destruction during design and off-design operation are essential. The overall goal of this project is the demonstration of a compact prototype incinerator with closed-loop active combustion control.	(January) The Board understood that the commercial sector cannot provide this equipment that meets Navy design specifications, and that miniaturizing is a principal objective of this proposal. The Board recommended this proposal for FY94 funding.
CP-249: Leak Location in Underground Pipelines (EPA) \$1,000K	The goal of this applied research and technology development effort is to develop and demonstrate a portable and on-line acoustic leak detection/leak location system to accurately and reliably test single and double walled pipelines of various sizes and content (i.e., gasoline, diesel, jet fuel, potable water, low level radioactive wastes, etc.). Such a system would not only assist the regulated community in complying with existing state and Federal regulations but would also reduce the spread of contamination and loss of drinking water through early and more accurate leak detection/location.	(January) The Board recognized this proposal as a novel and valuable approach to solve a difficult problem for both the government and private sectors. Accordingly, they recommended approval for FY94 funding.
CP-247: Characterization of Open Burning/Open Detonation Emissions (Army) \$1,128K	The substantial amounts of energetic materials (propellants, explosives, and pyrotechnics (PEP)) accruing within the Department of Defense (DoD) have become an increasing burden on the military logistics systems and have become the subject of growing public concern. Despite the critical need to reduce the demilitarization inventory, use of the only available process -- OB/OD -- has been sharply curtailed. Environmental regulators are demanding item-specific empirical data before granting OB/OD permits under subpart X of the Resource Conservation and Recovery Act (RCRA). These data are not available, and the system for obtaining them has not been fully developed. Limited small-scale testing indicates that OB/OD-generated emissions of interest are so minute that they pose no hazard to health or the environment. The goal of this project is to technologically expand testing facilities, instruments, and procedures so that they can be applied to current and projected disposal permitting data needs. This includes designing new and larger BangBox testing chambers, characterizing emissions of complete munitions, and grouping munitions into emissions families so that future testing requirements can be abbreviated.	(February) The Board voted to recommend approval of this project but requested greater participation and funding support by the other Services. In the future, the Board would like to see a better articulation of the Services' and agencies' investments in this area, as well as a detailed report of project accomplishments. The Board was encouraged by progress to date; however, based on the significant strides in this area, they do not anticipate funding this as a level of effort in the out-years.

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<b>CP-180: Hydrothermal Reduction of Energetic Wastes (USAF) \$1,400K</b>	<p>The goal of this project is to develop hydrothermal reduction (HTR) as an alternative to chemical hydrolysis for use (1) in systems designed for the safe, nonpolluting disposal of waste solid rocket propellant from manufacture, refurbishment, and demilitarization of large rockets, and (2) for disposal of selected Army, Navy, and Air Force conventional munitions. Final treatment of hydrolyzed energetics from the hydrothermal reduction treatment process could then be treated by biodegradation, supercritical water oxidation, or advanced oxidation processes.</p>	<p>(February) The Board recommended against funding this proposal as requested. The members recommended that the proposers redirect FY93 funds and the FY94 proposal to focus on an exploration of hydrothermal reduction and submit a revised proposal to the Executive Director. Depending on the revised funding request and the Executive Director's judgement, a revised proposal may or may not require another appearance before the SAB.</p> <p>A revised proposal was submitted to the Executive Director and funded in FY94 at \$375K.</p>
	<b>CONSERVATION</b>	
<b>CS-048: Whale Monitoring/Fishing Enforcement (Navy) \$3,000K</b>	<p>The goal of this effort is to continue to apply capabilities of the U.S. Navy Integrated Undersea Surveillance System (IUSS) to support the High Seas Driftnet Fisheries Act (PL102-582) and other national treaty and maritime law enforcement requirements, and to monitor various species of marine mammals to contribute towards conservation and regulations compliance. This work explicitly supports the SERDP Goal to "help solve significant...environmental problems through the application of (DoD's) technical capabilities..." The IUSS provides a unique resource to monitor the population and movements of several endangered marine mammals -- specifically, the great whales. In no other way can these movements be monitored over the scale of an ocean basin. Exploitation of this resource is vital in complying with the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), and the Marine Mammals Protection Act (MMPA).</p>	<p>(January) As expressed in the previous year, the Board considered this proposal an excellent example of using defense-developed technology for environmental purposes. Accordingly, they recommended that this proposal be approved for continued funding in FY94. However, they asked that (1) details on future milestones and associated costs be provided prior to continued funding in FY95, and (2) coordinated efforts continue to transfer this technology into a National Atmospheric and Oceanic Administration operations program.</p>
<b>CS-241: Assessment to the Management of Risks to Biodiversity (EPA) \$1,325K</b>	<p>This project is part of a comprehensive interagency research effort to develop the technical information and data bases needed to assess and manage risks to biodiversity. The project specifically addresses the need to "develop techniques to assess and predict the impact of military use of the areas on the critical elements of the ecosystem impacting biodiversity." Jointly, the Environmental Protection Agency, Department of Defense, US Fish and Wildlife Service, US Geological Survey, USDA Forest Service, and the Nature Conservancy will develop and test a risk-based paradigm for identifying those areas having species assemblages which contribute the greatest genetic diversity to the biota of their biogeographic regions and then managing those areas to sustain biodiversity.</p>	<p>(January) The Board recommended approval of this continuing project; however the members expressed several concerns that should be addressed over the course of the year. This EPA project will concentrate on military facilities in the West Coast Transect, yet there are no points of contact on the proposal list from either the Air Force or Navy. To fully relate the stressed species to quantifiable problems, these military POC's are necessary. Furthermore, cooperation with the national network of Land-Grant colleges and universities is highly recommended.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<b>EN-094: Advanced Cycle Mobil Heat Pump (USAF)</b> <b>\$850K</b>	<p>This project attempts to assess the feasibility of using advanced heat pump cycles (Stirling, Vuilleumier, etc.) to provide a bare base with highly efficient, low maintenance heating, ventilating, and air conditioning (HVAC) systems. Various design concepts for heat pumps will be examined, such as direct-absorption-vapor compression cycles, acoustic air conditioners, and compressor-less refrigeration cycle technologies. An analytical model for the selected concept will then be developed. This model will be used to engineer the new heat pump to meet bare base requirements. The resulting configuration will be analytically tested and its performance data compared with current systems to determine the cost effectiveness of the new equipment. This effort will eliminate the use of CFC's on deployable heat pumps and will provide a more energy efficient method of generating cooling.</p>	<p>(February) The Board members did not accept the proposal as presented, as it did not articulate an effective programming plan but rather appeared to be a compilation of piecemeal efforts. The SAB asked the briefer to return at the next meeting with a revised presentation describing the physics of the effort and the end product, as well as a detailed plan of milestones and associated costs. The Board also discussed the possibility of redirecting FY93 funds to more fully address the basic research in this project.</p> <p>(March) The Board felt that their concerns from the previous meeting were adequately addressed in this rebriefing; considerable technical and programmatic details were provided. Accordingly, the SAB recommended approval for this project as presented.</p>
<b>EN-639: Low Energy Model Installation Program (Army)</b> <b>\$1,650K</b>	<p>Current energy policy requires Federal and DoD facilities to reduce energy consumption and costs by 30% from 1985 to 2005, by implementing a variety of project and maintenance strategies, maximizing the use of alternative financing. The Energy Policy Act of 1992 requires that all projects which payback within ten years be completed by 2005. Proper analytical tools and methodologies to ensure optimum implementation of the energy program are not available. The DoD Low Energy Model Installation Program at Fort Hood, Texas, will demonstrate the effectiveness of the comprehensive approach while acting as a testbed for the development and technical transfer of tools and methodologies. This project is a combination of applied research, technology demonstration, and technology transfer. Continued funding is required to complete generic tool development, to develop construction design enhancement methodologies, to design projects, and to complete energy saving and sustainable development demonstration projects at Fort Hood.</p>	<p>(January) The Board understood that this project was directed toward demonstration of technologies and technology transfer. However, due to significant funding from other sources, the SAB could not determine SERDP's contribution to the effort's past accomplishments or future deliverables. Accordingly, prior to recommending approval, the members asked Dr. Fournier to provide them with a detailed breakout of the milestones that are supported with SERDP funds. Additionally, the Board requested the briefer to describe how the project "Photovoltaics for Military Applications" could be leveraged in this demonstration project. The SAB also requested a clear articulation of how these demonstrations will have applicability at locations other than Ft. Hood.</p> <p>(February) The Executive Director received the additional information that was requested at the previous meeting and discussed the specific development and demonstration efforts funded by SERDP. Furthermore, the Executive Director articulated how these efforts will have application across a spectrum of DoD uses. Having their requirements satisfied, the Board recommended approval for continued funding of this project. The SAB also encouraged further coordination and integration with Project EN-046: Photovoltaics for Military Applications.</p>



TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<b>EN-046: Photovoltaics for Military Applications (Navy/DOE)</b> <b>\$4,000K</b>	<p>This is a joint proposal from the Department of Defense (DoD) Photovoltaic Review Committee (PVRC), the Office of Naval Research, and the Department of Energy (DOE). The program goal is to support and accelerate existing DOE and DoD alternate energy programs to reduce the operational and cost impact of meeting environmental obligations in the DoD, as well as to transfer that technology and information to both the Federal and private sectors for widespread implementation. DoD is the largest single user of energy in the world with annual pollution emissions estimated at 720 million tons of CO<sub>2</sub>, 1.15 million tons of NO<sub>x</sub>, and 740,000 tons of SO<sub>x</sub>. The potential PV application base within DoD is estimated at 50+ MW for small remote systems (less than 25 kW), 200+ MW for intermediate to large remote systems (25 - 1000 kW), and 450+ MW for large, grid interactive systems (greater than 100 kW). Small stand-alone systems for the DoD are considered mature and proven. This program targets intermediate to large remote systems, grid interactive systems for remote "island" grids that generate their own power, and load leveling and uninterruptible power generation for large utility grids. The research elements of this project will focus on developing and optimizing the critical power processing equipment necessary to design and construct increasingly larger PV systems.</p>	<p>(January) This continuing effort focuses on developing the hardware and circuitry to control the mix of renewable energy, battery power, and fossil fuel power in hybrid power systems and in engineering the AC/DC power units for progressively larger units. The members of the Board were concerned over the high outyear funding projections of this project. They fully appreciated the need to develop the control technology this year; however, the proposed work lacked connectivity to development of specific photovoltaic systems during the out-years. Consequently, the Board asked Dr. Hasti to return at the next meeting and to provide additional information on the number of systems required to be developed, the necessary technology associated with these new systems, the costs associated with these efforts, the potential candidates for implementation of these systems and, where appropriate, a demonstrated commitment by the users at DoD facilities.</p> <p>(February) Dr. Hasti responded to the Board's questions in a rebriefing. The Board appreciated the additional information and recommended funding for one year. Furthermore, they requested a detailed break-out of planned versus actual milestones achieved for a briefing to the SAB during the FY95 program development process.</p>
	<b>GLOBAL ENVIRONMENTAL CHANGE</b>	
<b>GEC-015: Atmosphere Remote Sensing &amp; Assessment Program (ARSAP) (Navy/DOE)</b> <b>\$24,700K</b>	<p>This research proposal is a continuation of the DOE-DoD SERDP program to develop improved measurements and understanding of the Earth's atmosphere and its response to global change. The project draws heavily on DoD and DOE defense capabilities to "develop innovative technologies to measure stratospheric ozone levels and the radiatively important trace gases...to understand their effects on climate systems." Both DOE and DoD need improved measurements of trace gases, radiative fluxes, cloud properties, and water-vapor profiles. These are critical to understanding three key global change issues: (1) the role of radiation-cloud interactions on the earth's radiation budget; (2) the evolution and fate of ozone in the middle atmosphere; and, (3) the coupled effect of increases in greenhouse gases and ozone depletion on climate change and the potential for early detection of global change in the middle atmosphere. In addition, these measurements are of high priority to the DoD for improved atmospheric and near space weather forecasting, for predicting infrared backgrounds for surveillance weapon sensor systems, and for characterizing ionosphere effects on communications and satellite drag and missile reentry dynamics.</p>	<p>(January) The members of the Board were pleased with the goals, technical approach, accomplishments, and future milestones of this joint effort, and they were satisfied with the project's approach to transition the effort. They did express reservations about the enormous cost of this project, as is potentially limits other opportunities within the GEC Thrust Area, if not the entire SERDP Program. In the future, the Board will review each project for its impact on the respective thrust area and the overall Program budget.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<p><b>GEC-286: Acoustic Monitoring of Global Ocean Climate (ARPA)</b> \$17,000K</p>	<p>The Acoustic Monitoring of Global Ocean Climate program goals are to conduct a research program to measure and analyze changes in global ocean temperature to advance our understanding of short and long-term ocean variability and its relation to climate trends. The oceans play a key, but still poorly understood, role in the most important processes contributing to climatic changes such as heat and carbon dioxide storage. The main goal of this proposed research is to directly measure global ocean temperature trends using innovative underwater acoustic technologies, based on the fact that the speed of sound in water is proportional to temperature. A further goal is to develop an ocean-atmosphere modeling capability and supporting database to permit skilled forecasts of significant global environmental changes, which are of major impact in global change and climate prediction.</p>	<p>(January) The SAB members were impressed with the technical merit of this continuing project; however, they voiced a concern that milestones, tasks, and associated costs were not provided in sufficient detail, especially in view of the large funding request. Additionally, the SAB members desired to understand how FY91-93 funds contributed to the project's accomplishments during this time frame. With regard to commencing a Phase II global effort in FY95, the Board expressed several concerns. It is expected that Phase I will achieve the goals of developing the prototype system, and scaled-up systems may not be appropriate for SERDP funding. Furthermore, there are many users and partners in the Phase II effort; resources for the expansion of this effort should be derived in part from these sponsors. Accordingly, the proposal was recommended for approval for FY94 funds and limited to the Phase I effort.</p>
	<b>POLLUTION PREVENTION</b>	
<p><b>PP-116: Solid State Metal Cleaning (USAF)</b> \$1,050K</p>	<p>Cleaning of metals is a mandatory step in the processing of aircraft components, including wing skins, fuselage panels and bulkheads, etc.. Cleaning occurs prior to surface preparation, such as anodizing, and subsequent priming in preparation for coating or adhesive bonding. State-of-the-art cleaning processes now involve the use of PD 680 type solvents, chlorinated solvents, or water based cleaning systems to remove oil, waxes and particulates from the surface of component surfaces. The goal of this project is to develop innovative metal cleaning processes that do not require the use of water or volatile organic compounds (VOCs).</p>	<p>(February) The Board reviewed this proposal as one of several Air Force projects that dealt with cleaning and coatings removal process. This effort addresses the use of solid materials to clean aluminum and steel in lieu of the toxic cleaning bath processes. The Board members recommended approval of this proposal but encouraged briefers of multiple, related proposals to, in the future, illustrate project interrelationships in achieving the overall technical objectives.</p>
<p><b>PP-130: Non-Chemical Surface Preparation (USAF)</b> \$998K</p>	<p>Conventional cleaning and surface treatment processes used in the aerospace industry often involve the use of toxic materials and solvents and the generation of aqueous hazardous waste streams. These processes involve toxic hazards in the workplace, risk of uncontrolled releases of hazardous substances, and treatment and disposal procedures which are costly, administratively burdensome, and are accompanied by serious legal and financial liabilities. In addition, many traditional materials, such as ozone depleting chemicals, are subject to bans on production and use. The project objective is to identify, develop, and optimize non-wet chemistry approaches for the formation of stable morphologies on the surface of aluminum, titanium, and copper materials that will allow performance of high quality coating or adhesive bonding.</p>	<p>(February) The Board recommended approval of this project as presented, and they encouraged an objective of reduction of waste in addition to that of new material handling techniques. Furthermore, they strongly recommended that this project, as well as the other Air Force pollution prevention projects, incorporate more researchers and academics in their steering and oversight committees.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<b>PP-139: Laser Cleaning and Coatings Removal (USAF) \$2,100K</b>	<p>Cleaning and coatings removal technologies have traditionally depended upon the use of organic solutions, such as, PD 680 (I, II, &amp; III) methyl ethyl ketone (MEK), methylene chloride (MECL), phenol, and strong acids and bases, as well as hot potassium permanganate solutions. These materials are hazardous and include volatile organic compounds (VOCs), ozone depleting chemicals (ODCs) and air toxic emitters which are subject to severe restrictions or are being banned altogether, such as freon (CFC-113). More recently, the trend in cleaning technology is directed toward the use of water-based cleaners (sodium metasilicate, bases, terpene/water emulsions or water detergent blends), some of which may be hazardous to some degree. However, technologies are needed which do not involve generation of waste water streams. The goal of the proposed effort is to provide a field demonstration of a prototype laser-based facility to demonstrate environmentally acceptable component cleaning and coating removal technology and to transition it to aerospace users.</p>	<p>(February) The Board agreed to defer action on this proposal until the next meeting. In the meantime, the Board members requested a clarification of expenditures -- especially R &amp; D expenditure versus other costs -- and emissions generated from the laser process, including gases, particulates, etc. The Board also requested to see the subject literature regarding the laser process that was referred to in Mr. Reinhart's presentation.</p> <p>(March) In this return brief, the SAB reviewed the requirements for the design and associated costs of the prototype. The members were not comfortable with the funding request of \$2.1M for FY94 and FY95 without knowledge of the results of the FY93 design study effort. Consequently, the Board recommended approval to fund this proposal but recommended that funding be incremental: \$1M for the first increment to initiate contracts, followed by a second increment to be determined by the Executive Director (but not to exceed \$1.1M) after the results of the design study are known.</p>
<b>PP-309: Non-Ozone Depleting Refrigerants for Shipboard Coolers (EPA) \$1,000K</b>	<p>The Navy currently has approximately 900 shipboard chillers using CFC-114 refrigerant for purposes of vital equipment cooling and comfort air-conditioning. By law, production of CFC-114 must cease by December 31, 1995. The Navy must, therefore, find a suitable alternative refrigerant to retrofit all of its CFC-114 chillers (as the supply of CFC-114 dwindles) or convert the entire fleet to entirely different cooling plants. Retrofitting existing chillers instead of replacing these units would save the Navy in excess of \$500 million. Work is progressing satisfactorily in concert with the Navy's performance testing of both HFC-236ea and HFC-236fa in a 12.5-ton chiller of the type used on ships. This project seeks to continue and expand the evaluations of both chemicals (primarily toxicological testing) along a parallel path until such time as one chemical can be clearly identified as superior to the other. When a preference for one of the chemicals is decided, further work will concentrate on the preferred alternative.</p>	<p>(February) The Board acknowledged the continuing need to develop substitute refrigerants for CFC-114 and appreciated the complementary funding support by the Navy. The high costs of the 2 year toxicity testing, including the costs for procuring testing materials, concerned the Board. Consequently, the Board voted to approve this continuing project but would closely scrutinize the project's milestone accomplishment and resource execution and would reevaluate this effort on an annual basis.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
PP-063: Clean Agile Manufacturing Technology for Propellants, Explosives, and Pyrotechnics (PEP) DoD/DOE \$3,700K	The objective of this program is to develop integrated product/process development (IPPD) technologies and tools to achieve concepts for reconfiguring existing PEP life-cycle facilities into a clean, agile enterprise that will function economically with total life-cycle wastes reduced by 90%. In the context of this proposal, life-cycle facilities are defined to be the set of existing, geographically separate, PEP facilities that design, develop or produce PEP products, recycle the production by-products into usable products, or recycle PEP parts returned as excess from the ordnance inventory.	(February) The Board voted to recommend approval but requested a more detailed budget that describes expenditures by milestone and by cost category, i.e. engineering, overhead, infrastructure, etc. The revised budget should also explain and quantify the financial contributions of other agencies and Services.
PP-331: Integrated Expert Solvent Substitution Database (EPA) \$3,000K	The goal of this project is to build an integrated solvents substitutes data base from existing data bases and potentially redundant activities underway in each of the participating and other agencies. The resultant expert tool would combine priority information from each existing data base such as compatibilities and performance, and fill gaps by providing economic analyses and vendor information. It would be targeted for direct use by all DoD depots, logistics centers, defense contractors, small and medium industries, as well as state technical assistance offices, NIST Manufacturing and Technology Centers, and universities implementing the EADS program. This data base could provide an important technology transfer function for Federal Agencies, states, and small and medium industries to advance the reduction of hazardous waste releases/emissions in meeting the Executive Order on Federal Compliance's (12856) 50% reduction of TRI toxics by 1999, and the Clean Air Act/SNAP hammer deadlines. It will assist in the redevelopment of many Mil Spec Standards under executive Order 12856, and will assist each agency and the US in meeting its ozone depletion reduction and toxics use reduction goals. The project will also demonstrate federal cooperation and environmental leadership by promoting and making publicly available the successes and lessons learned by the participating agencies. This project originally requested \$1,700K.	<p>(February) The Board recognized the potential utility of this effort but agreed to defer action on this project until the next meeting. Prior to the next meeting, the Board requested a clarification of the milestones and the budget, including a break-out of the financial contributions of other agencies -- especially EPA -- and Services. Further, the Board members would like to see a flow chart indicating how and when the different elements of this effort come together and what will be available in terms of information at any point in time. The Board went on to suggest that since this type of information will be critical to the DoD in the very near future, perhaps the project should be accelerated with greater SERDP funding in the near term and substantially increased EPA support in the out-years.</p> <p>(March) The Board appreciated Mr. Morse's responses to their questions from the last meeting, and they observed that the increased request for FY94 funds (now \$3M) was due to an accelerated effort to develop the expert system engine to manage the solvent substitution database. Furthermore, Board members were gratified that EPA will fund the operation and maintenance of this effort over the long term. The Board was concerned, however, that the data provided by the database should be validated as fully as possible. Upon receiving assurances that appropriate parts of this database could be periodically validated, the Board unanimously recommended approval at the revised \$3.0M level.</p>

TITLE/AGENCY/ REQUESTED VALUE	SUMMARY	RECOMMENDATION
<b>PP-134: Large Aircraft Robotic Paint Stripping (LARPS) (USAF) \$1,940K</b>	<p>The Air Logistics Centers primary method to remove organic coatings from aircraft structures is with methylene chloride-based chemical stripping compounds. Protective coatings for large aircraft primary and secondary structures consists of thin skin metallic and composite materials which must be removed by environmentally clean processes. The disadvantages of chemical paint stripping are: long processing time, expensive and hazardous chemicals, personnel exposed to hazardous environment, chemicals causing premature degradation of the working areas, and the requirement of special disposal techniques to minimize environmental impact. Methylene chloride and other hazardous chemicals will be banned by the Air Force in 1997 and the Environmental Protection Agency, or by federal law by the year 2000. An environmentally safe, high pressure water system is currently being developed as a Air Force Manufacturing Technology (MANTECH) project. This effort address thin skin metallic structures and composite components, but not aircraft radomes. The composite work requirements need to be expanded for radomes. Depot radome repairs consist of removing or "stripping" multi-layer dielectric coatings, filling and smoothing voids in the radome wall, and then applying new dielectric coatings on to the radome surface. The overall technical effort of the LARPS will be expanded to address radome coating removal needs. Development actions for large aircraft primary and secondary structures manufactured from thin skin aluminum and composite structures will be continued.</p>	<p>(February) The SAB agreed to defer action in order to better comprehend the integration of related tasks within this project. Accordingly, the Board requested an articulation of how the planned \$1.94 million for R&amp;D in FY94 will be applied to composite materials research, as well as a detailed milestone break-out and accounting of the \$950K from previous years' investments. To demonstrate how LARPS in the Air Force is linked to similar objectives of the other Services (particularly Navy), a break-out of funds contributed by the other Services and their associated tasks are also requested. The Board suggested that this program try to incorporate the Army in this effort, especially with regard to tank maintenance. Furthermore, based on the briefed objectives for FY94, no FY95 request appears necessary. Finally, the Board clarified that these requests are indicative of their enthusiasm and support for this effort, versus apparent criticism.</p> <p>(March) The Board did not feel that their concerns from the previous meeting were fully addressed in this rebriefing; however, the members reiterated their support for this effort. The Board recommended funding this project with the requirements that: (1) the proposers draft and submit, as a mandated deliverable, a thoughtful plan/program to fully test the long term effects of this process on composite materials, and (2) the proposers submit a thorough accounting of the FY92 funds that have already been committed and expended on this project. This material is due at the annual review.</p>
<b>PP-127: Advanced Nickel- Metal Hydride Battery (USAF) \$945K</b>	<p>This project seeks to develop Ni-MH<sub>x</sub> batteries to eliminate lead and cadmium containing rechargeable batteries and to enhance Ni-MH<sub>x</sub> performance to meet Air Force/DoD requirements.</p>	<p>(March) The Board members complemented the proposer on this presentation and agreed that the potential benefits derived from this research may be substantial. However, the Board believed that this project lacked focus and non-SERDP funding support. Further, the Board felt that this effort may be too late to add significantly to the wealth of similar research that is underway in other sectors. As a result, the SAB did not recommend funding this effort in FY94 and suggested that the remaining FY93 funds be directed towards a full investigation of the various potential metal hydride alternatives.</p>

## APPENDIX C -- SAB BYLAWS

### SERDP SCIENTIFIC ADVISORY BOARD BYLAWS

10 U.S.C. Sec. 2904(d) provides that, "(t)he Advisory Board shall prescribe procedures for carrying out its responsibilities. Such procedures shall define a quorum as a majority of the members.."

Consistent with this statutory authority, the SERDP Scientific Advisory Board, by a vote of the majority of the members of the quorum present, adopted the following Bylaws to be effective for the SAB meeting of January 26-28 and to remain in effect unless and until amended.

1. Quorum - A quorum for meetings of the Scientific Advisory Board (SAB) is a majority of the members of the SAB.

2. Proxy voting - Proxy voting at meetings of the SAB shall be permitted only in accordance with the following:

a. A quorum is present. Proxies shall not be used to create a quorum.

b. Proxy votes may be cast on behalf of any absent member, pursuant to instructions provided by such absent member to any other member present and voting, on SAB recommendations to the Council that the SAB considers appropriate regarding any proposed research project referred to the SAB or any other recommendations.

3. Emergency Actions - Notwithstanding the requirements for a quorum set forth in paragraph 1., above, the Chair may permit actions to be taken by the SAB in the absence of a quorum if he or she determines that not to proceed in the absence of a quorum might deprive the Council of the timely views of the members of the SAB present. Any such actions by the SAB in the absence of a quorum are null and void unless they are ratified by the SAB (a) at a later time in the same meeting, a quorum being present, (b) after discussion at the next meeting of the SAB, a quorum being present, or (c), via a majority vote of all the members of the SAB via FAX, all members of the SAB having received written notice of the issue at hand. A majority of the members of the SAB may request a teleconference to discuss and vote upon such ratifications in lieu of a vote via FAX. A quorum must be present at any such teleconference. If recommendations are made by members of the SAB when a quorum is not present and such recommendations have not been subsequently ratified in accordance with the above procedures, the Council shall be so advised when the recommendations are submitted.

APPROVED BY A MAJORITY VOTE OF THE SAB, A  
QUORUM BEING PRESENT, JANUARY 27, 1994

  
Dr. Marvin Moss, Vice Chairman